

I CLAIM:

1 1. A mass transfer device having a fluid permeable
2 core for passage of a bulk fluid, said core having a
3 bulk fluid inlet end, a bulk fluid outlet end, an inner
4 surface surrounding an inner passageway and an exterior
5 surface and having a longitudinal axis, said core
6 having a plurality of windings of a tubular, semi-
7 permeable membrane wrapped around said exterior surface
8 of said core said windings forming a fiber bundle
9 having a bore fluid inlet end and a bore fluid outlet
10 end wherein the improvement comprises:

11 said fluid permeable core being fabricated from a
12 sintered plastic or metal material having pores ranging
13 in size from about 50 microns to about 200 microns, and
14 said core having a baffle positioned against said inner
15 surface interrupting said inner passageway so that bulk
16 fluid entering said inlet end must exit said inner
17 passageway, pass outwardly through said pores on a feed
18 side of said baffle to the exterior surface of said
19 core and then flow inwardly through said pores below to
20 an outflow side of said baffle from the exterior
21 surface to said inner passageway;

22 a first plurality of parallel, semi-permeable
23 hollow fibers wound around the exterior of said core at

24 an acute angle facing said bulk fluid outlet end of
25 between about 30 and 60 degrees with respect to the
26 longitudinal axis of said core;

27 a second plurality of parallel, semi-permeable
28 hollow fibers wound around the exterior of said core at
29 an angle facing said bulk fluid inlet end of between
30 about 30 and 60 degrees with respect to the
31 longitudinal axis of said core, said first and second
32 plurality of parallel, semi-permeable hollow fibers
33 forming a hollow fiber bundle and said bundle being
34 potted at an inlet end and at an outlet end of said
35 hollow fiber bundle and transversely cut to provide a
36 bore fluid inlet end and a bore fluid outlet end and a
37 bore fluid passageway comprising a plurality of hollow
38 bore passageways;

39 an impermeable housing surrounding said hollow
40 fiber bundle extending between an inlet end of said
41 housing at said hollow fiber bundle inlet and an exit
42 end of said housing at said hollow fiber bundle outlet
43 end;

44 a bore fluid entrance manifold having a bore fluid
45 entrance fitting affixed to said inlet end of said
46 housing and a bore fluid outlet manifold having a bore
47 fluid outlet fitting affixed to said outlet end of said
48 housing;

49 a bulk fluid inlet fitting affixed to said bulk
50 fluid inlet end of said core; and

51 a bulk fluid outlet fitting affixed to said bulk
52 fluid outlet end of said core whereby a bulk fluid may
53 be passed into said bulk fluid inlet fitting, pass into
54 said inner passageway of said core, pass outwardly
55 through said fluid permeable core upstream of said
56 baffle, pass over the exterior of said hollow fiber
57 bundle, pass inwardly through said fluid permeable core
58 downstream of said baffle and out of said bulk fluid
59 outlet fitting while bore fluid passes into said bore
60 fluid inlet fitting, through the bore fluid passageways
61 of said hollow fiber bundle and out of said bore fluid
62 outlet fitting.

2. The mass transfer device of claim 1 wherein said
core is fabricated the group consisting essentially of
from sintered polyethylene beads, polypropylene beads,
and metal beads.

- 1 3. The mass transfer device of claim 1 wherein said
2 hollow fibers are fabricated from a polymer selected
3 from the group consisting essentially of polyethylene,
4 polypropylene, polysulfone, polyether, sulfone,
5 polyvinylene di-flouride.

1 4. The mass transfer device of claim 1 wherein said
2 hollow fibers are wound about said core in single or
3 multiple fibers along said core and wound so that each
4 of the fibers are spaced from one another from ten
5 microns to one hundred microns.

1 5. The mass transfer device of claim 1 wherein said
2 first plurality of parallel, semi-permeable hollow
3 fibers is wound at an angle of about 35 degrees with
4 respect to said second plurality of parallel, semi-
5 permeable hollow fibers.